Math 212
Requiz 25A

F 04 Nov / N 06 Nov

Your name: _____

Exercise

(5 pt) Consider two spheres of radius 1 in $\mathbf{R}^3$, one centered at $(0,0,0)$, the other centered at $(0,0,1)$. We seek to find the volume $V(E)$ of the region E lying inside both spheres.

(a) (1 pt) Sketch the region E.

(b) (2 pt) One way to compute the volume of E is to use triple integrals. State your choice of coordinate system. Write the corresponding differential dV, and give an algebraic description of the region E in these coordinates. *Hint:* Partition E into two subregions, E_1 and E_2, based on where the spheres intersect. One region will have all limits on the variables constant, the other region will not.

(c) (2 pt) Show that $V(E) = \frac{5\pi}{12}$. *Hint:* Evaluate the triple integral over E_1 and E_2 separately. Mind your integration factor.